DOCUMENT RESUME

ED 357 832 PS 021 229

AUTHOR Paul, Richard
TITLE The Logic of Creative and Critical Thinking.
PUB DATE [91]
NOTE 9p.
PUB TYPE Viewpoints (Opinion/Position Papers, Essays, etc.) (120)

EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Cognitive Processes; *Creative Thinking; Creativity; *Critical Thinking; *Intellectual Development; Logical Thinking; *Thinking Skills

ABSTRACT

This paper explores the intimate connection between creative and critical thinking, by arguing that both are inseparable in everyday reasoning. The details of the relationship between creative and critical thinking are worked out in relation to the processes of: (1) thinking through the logic of things; (2) taking command of reasoning and logic; (3) making fundamental assumptions about learning and knowing; (4) understanding the logic of concepts; and (5) understanding the logic of academic disciplines. The details of the relationship are also considered in the context of the logic of language; of questions; of student thinking; of teaching; of reading, writing, speaking, and listening; and of logic itself. The underlying theme of the paper is that intellectual discipline and rigor are involved in originality and productivity, and are inseparable aspects of excellence of thought. It is concluded that intellectual standards and discipline do not stand in the way of creativity, but provide a way to begin to generate it; and that intellectual work develops the intellect simultaneously as a creator and an evaluator. (SM)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
X This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

TM

The Logic of Creative and Critical Thinking

"PERMISSION TO REPRODUCE THIS MATERIAL IN **OTHER THAN PAPER COPY** HAS BEEN GRANTED BY
Renee Denise
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

ED357832

Abstract

In this paper Richard Paul develops an extended explication of the relationship between creative and critical thinking. He does so by first setting out the relationship in general, arguing that both are perfections of thought which are, in fact, inseparable in everyday reasoning. "Creativity", according to Paul, masters a process of "making" or "producing", "criticality" a process of "assessing" or "judging". He then argues that insofar as the mind — in thinking — is thinking well, it must, virtually simultaneously, both produce and assess, make and judge that making.

Having set out this relationship in general, Paul works out the details with respect to a series of theoretically basic structures and processes: 1) thinking through the logic of things, 2) taking command of reasoning and logic, 3) making fundamental assumptions about learning and knowing, 4) understanding the logic of concepts, 5) understanding the logic of academic disciplines, 6) the logic of language, 7) the logic of questions, 8) the logic of student thinking, 9) the logic of teaching, 10) the logic of reading, writing, speaking, and listening, and 11) the logic of logic. Throughout, the underlying theme of the paper is sustained: that intellectual discipline and rigor are not only quite at home with originality and productivity but that both so-called "poles" of thinking are really unseparable aspects of excellence of thought.

Beyond exploring the relation of creativity and criticality, this paper is one of the best in the collection for giving the reader a unified sense of the importance to critical thinking of the concept, "the logic of..." On Paul's analysis, this concept is indispensable and, if one reads with a sensitivity to it, one will find that it plays a role in virtually everything he writes.

✦ *Introduction*

Creative and critical thinking often seem to the untutored to be polar opposite forms of thought, the first based on irrational or unconscious forces, the second on rational and conscious processes, the first undirectable and unteachable, the second directable and teachable. There is some, but very little, truth in this view. The truth in it is that there is no way to generate creative geniuses, nor to get students to generate highly novel ground-breaking ideas, by some known process of systematic instruction. The dimension of "creativity", in other words, contains unknowns, even mysteries. So does "criticality" of course. Yet there are ways to teach simultaneously for both creative and critical thinking in a down-to-earth sense of those terms. To do so, however, requires that we focus on these terms in practical everyday contexts, that we keep their central meanings in mind, and that we seek insight into the respect in which they overlap and feed into each other, the respect in which they are inseparable, integrated, and unitary. This paper will develop these insights.

Overview

Good thinking is thinking that does the job we set for it. It is thinking that accomplishes the purposes of thinking. If thinking lacks a purpose, that is, is aimless, it may chance upon something of value to the thinker, but more often it will simply wander into an endless stream of unanalyzed associations from one's unanalyzed past: "hotdogs remind me of ball games, ball games remind me of Chicago, Chicago of my old neighborhood, my old neighborhood of my grandmother, of her pies, of having to eat what I didn't like, which reminds me ... which reminds me ... which reminds me...." Few people need training in aimless thinking such as this, or in daydreaming or fantasizing. For the most part we are "naturals" at aimless thinking.

Where we have trouble is in purposeful thinking, especially purposeful thinking that involves figuring things out, thinking, in other words, that poses problems to be solved and intricacies to reason through. "Criticality" and "creativity" have an intimate relationship to the ability to figure things out. There is a natural marriage between them. Indeed, all thinking that is properly called "excellent" combines these two dimensions in an intimate way. Whenever our thinking excels, it excels because we succeed in designing or engendering, fashioning or originating, creating or producing results and outcomes appropriate to our ends in thinking. It has, in a word, a *creative* dimension.

But to achieve any challenging end, we must also have *criteria:* gauges, measures, models, principles, standards, or tests to use in judging whether we are approaching that end. What is more, we must apply our criteria (models, gauges, measures, models, principles) in a way that is discerning, discriminating, exact, fastidious, judicious, and acute. We must continually monitor and assess how our thinking is going, whether it is plausibly on the right track, whether it is sufficiently clear, accurate, precise, consistent, relevant, deep, or broad for our purposes.

We don't achieve excellence in thinking with no end in view. We don't design for no reason, fashion and create without knowing what we are trying to fashion and create. We don't originate and produce with no sense of why we are doing so. Thinking that is random, thinking that roams aimlessly through half-formed images, that meanders without an organizing goal is not a candidate for either "creativity" or "criticality". It is not a candidate for excellence.

PS 022 129

BEST COPY AVAILABLE

Why? When the mind thinks aimlessly, its energy and drive are typically low, its tendency is commonly toward inertness, its results usually barren. What is aimless is also normally pointless and moves in familiar alliance with indolence and dormancy. But when thinking takes on a challenging task, the mind must then come alive, ready itself for intellectual labor, engage the intellect in some form of work upon some intellectual object — until such time as it succeeds in originating, formulating, designing, engendering, creating, or producing what is necessary for the achievement of its goal. Intellectual work is essential to *create* intellectual products, and that work, that production, involves intellectual standards *judiciously* applied, ... in other words, creativity and criticality interwoven into one seamless fabric.

Like the body, the mind has its own form of fitness or excellence. Like the body, that fitness is caused by and reflected in activities done in accordance with standards (criticality). A fit mind can successfully engage in the designing, fashioning, formulating, originating, or producing of intellectual products worthy of its challenging ends. To achieve this fitness, the mind must learn to take charge of itself, to energize itself, press forward when difficulties emerge, proceed slowly and methodically when meticulousness is necessary, immerse itself in a task, become attentive, reflective, and engrossed, circle back on a train of thought, recheck to ensure that it has been thorough, accurate, exact, and deep enough.

Its generativeness and its judiciousness can only be artificially separated. In the process of actual thought they are one. Such thought is systematic when being systematic serves its end. It can also cast system aside and ransack its intuitions for a lead — when no clear maneuver, plan, strategy, or tactic comes to mind. Nor is the generative, the productive, the creative mind without standards for what it generates and produces. It is not a mind lacking judiciousness, discernment, and judgment. It is not a mind incapable of acuteness and exactness. It is not a mind whose standards are unclarity, imprecision, inaccuracy, irrelevance, triviality, inconsistency, superficiality, and narrowness. The fit mind generates and produces precisely because it has high standards for itself, because it cares about how and what it creates.

Serious thinking originates in a commitment to grasp some truth, to get to the bottom of something, to make accurate sense of that about which it is thinking. This "figuring out" cannot simply be a matter of arbitrary creation or production. There must be specific restraints and requirements to be met, something outside the will to which the will must be bent, some unyielding objectivity we must painstakingly take into account and neither ignore nor thrust aside. It is exactly the severe, inflexible, stern fact of reality that forces intellectual criticality and productivity into one seamless whole. If there were no "objectivity" outside our process of "figuring out", then we would have literally nothing to figure out. If what we figure out can be anything we want it to be, anything we fantasize it as being, then there is no logic to the expression "figure out".

In a sense, of course, all minds create and produce in a manner reflective of their fitness or lack thereof. Minds indifferent to standards and disciplined judgment tend to judge inexactly, inaccurately, inappropriately, prejudicially. Prejudices, hate, irrational jealousies and fears, stereotypes and misconceptions — these too are "created", "produced", "originated" by minds. Without minds to produce them, they would not exist. Yet they are not the products of "creative" minds. They reflect an undisciplined, an uncritical mode of thinking and therefore are not properly thought of as products of "creativity". In short, except in rare circumstances, creativity presupposes criticality and criticality creativity. This is the essential insight behind this paper.

In what follows, therefore, we shall explore the intimate connection between a well-grounded sense of creativity in thinking, the sense of thinking as a *making*, as a process of *creating* thought, as a process that *brings thoughts into being* to organize, shape, interpret, and make sense of our world — thinking that, once developed, enables us to achieve goals, accomplish purposes, solve problems, and settle important issues we face as humans in a world in which rapid change is becoming the only constant. This sense of *thought as a creative making* is the most important sense of creativity, pedagogically speaking, and cannot be understood, as I have briefly argued, separate from understanding the development of "critical judgment" and a critical mind. When a mind does not systematically and effectively embody intellectual criteria and standards, is not disciplined in reasoning things through, in figuring out the logic of things, in reflectively devising a rational approach to the solution of problems or in the accomplishment of intellectual or practical tasks, that mind is not "creative". In this sense, there is a reciprocal logic to both intellectual creation and critical judgment, to the intellectual "making" of things and to the on-going "critique" of that making. Let us examine that reciprocal logic more closely.

✦ *Thinking That Grasps the Logic of Things*

All intellectual products, in order to be intellectually assessed and validated, require some logic, some order or coherence, some intellectual structure that makes sense and is rationally defensible. This is true whether one is talking of poems or essays, paintings or choreographed dances, histories or anthropological reports, experiments or scientific theories, philosophies or psychologies, accounts of particular events or those of general phenomena or laws. A product of intellectual work that makes no sense, that cannot be rationally analyzed and assessed, that cannot be incorporated into other intellectual work, or used — and hence that cannot play a role in any academic tradition or discipline — is unintelligible. Whether we are designing a new screw driver, figuring out how to deal with our children's misbehavior, or working out a perspective on religion, we must order our meanings into a system of meanings that make sense to us, and so, in that respect, have a logic.

This is to say that there is an important role for reason and reasoning, for constructing and working within a logic, for creative producing and critical assessing of what is produced, in every intellectual enterprise. Let us now explore that role in brief.

What Is Reasoning? What Is Logic?

The words 'reasoning' and 'logic' each have both a narrow and a broad use. In the narrow sense, 'reasoning' is drawing conclusions on the basis of reasons, and, in the narrow sense, 'logic' refers simply to the principles that apply to the assessment of that process. But in the broad sense, 'reason' and 'reasoning' refer to the total process of figuring things out, and hence to every intellectual standard relevant to doing that. And parallel to this sense is a broad sense of 'logic' which refers to the basic structure that one is, in fact, figuring out (when engaged in reasoning something through).

One can draw conclusions about poems, microbes, numbers, historical events, languages, social settings, psychological fears, everyday situations, character traits — indeed, about anything whatsoever. And this drawing of conclusions is part of a broader process of reasoning things through. The particular inferences made have a specific logic that can be assessed and the total process of reasoning things through has a general logic that also can be assessed. In this broad sense of 'logic', one focuses on the logic of the poem or the logic of a microbe or the logic of numbers or the logic of a historical event or the logic of a language, and so forth. In the narrow sense, one focuses on the logic of this or that inference within a given poem or about a given microbe or within some train of mathematical thought. Hence, Sherlock Holmes tries to figure out the logic of the murder by making a number of specific inferences from the available evidence. The broader logic contains the narrower logic.

What Makes Good Reasoning Good Reasoning (in the broad sense)?

Becoming adept at drawing justifiable conclusions on the basis of good reasons is more complex than it appears. This is because drawing a conclusion is always the tip of an intellectual iceberg. It is not just a matter of avoiding a fallacy in logic (in the narrow sense). There is much more that is implicit in reasoning than is explicit, there are more components, more "logical structures" that we do not express than those we do. To become skilled in reasoning things through we must become practiced in making what is implicit explicit so that we can "check out" what is going on "beneath the surface" of our thought.

Thus, when we draw a conclusion, we do so in some circumstances, making inferences (that have implications and consequences) based on some reasons or information (and assumptions), using some concepts, in trying to settle some question (or solve some problem) for some purpose within some point of view.

Good reasoners can consider and plausibly assess any of these elements as they function in their thought in any act of reasoning something out. Good reasoners therefore use good logic in both the narrow and the broad sense. Furthermore, in most circumstances in which we are *using* logic we are *creating* it simultaneously. This needs explanation.

✦ *Whenever We Are Reasoning Something Through We Are Ipso Facto Engaged in Creative Thinking*

In the broad sense, all reasoned thinking is thinking within a logic, and when we have not yet learned a given logic — e.g., not yet learned the logic of the internal combustion engine, the logic of right triangles, or the logic of dolphin behavior — our minds must bring that logic into being, create it in the fabric, within the structure, of our established ways of thinking. Hence, when we are thinking something through for the first time, to some extent, we create the logic we are using. We bring into being new articulations of our purposes and of our reasons. We make new assumptions. We form new concepts. We ask new questions. We make new inferences. Our point of view is worked out in a new direction, one in which it has never been worked out before.

Indeed, there is a sense in which all reasoned thinking, all genuine acts of figuring out anything whatsoever, even something previously figured out, is a new "making", a new series of creative acts, for we rarely recall our previous thought whole cloth. Instead we generally remember only some part of what we figured out and figure out the rest anew, based on the logic of that part and other logical structures more immediately available to us. We continually create new understandings and re-create old understandings by a similar process of figuring.

In what follows, I will articulate a frame of reference that highlights the intimate interplay between creative and critical thinking, between the thinking that creates a set of logically interrelated meanings and the thinking that assesses the logic being created. I will begin with a basic assumption that underlies the model being developed. The theme that shall run throughout is as follows:

In all contexts that demand the reasoned figuring out of something, there are, as it were, *three logics* involved: *1)* the logic to be figured out (the logic it is our aim to create), *2)* the logic we use to do the figuring (chosen by us from the logics we have already learned), and *3)* the logic that results, in the end, from our reasoning (and which needs to be assessed for its "fit", for the degree to which it has captured the logic to be figured out). For example, I may use my understanding of the logic of one D.H. Lawrence novel (say, *Sons and Lovers*) as an initial framework for understanding the logic of another (say, *Lady Chatterley's Lover*). The understanding I end up with may or may not fully make sense of the actual story. The logic I make of it may be inadequate. Or again, in studying history, I may use my understanding of the logic of one economic crisis (say that of the thirties in the USA) to understand another one (say that of the nineties in the USA). The reconstruction I come up with may or may not make sense of the logic of what was actually going on economically in the nineties. In all our learning we must seek out provisional models (mini logical systems) for figuring out what we are trying to learn (the system we are trying to grasp). We then end up with a product of thought, a system we create. That system may or may not be adequate to the task.

A Basic Assumption

In all of our behavior we assume there is order, regularity, and potential intelligibility in everything; that every portion of "reality" can sooner or later be figured out, explained, and related to other portions; that our innate capacity to form conceptions of, and make inferences about, ourselves and the things around us is adequate for our purposes. This basic assumption implies that in some sense there is a discoverable logic to each dimension of reality. Of course, in making this assumption, we need not also assume that what we discover about the logic of things, from our various concepts and inferences, is some form of "Absolute Truth", nor that our knowledge of things exhausts, completely spells out, or totally captures the ultimate nature of things, or even that things have an "ultimate" nature. For one thing, our knowledge is always limited by the perspectives that are inherent in our various ways of forming concepts and making inferences. We are limited, not infinite, creatures; humans, not gods.

✦ *The Logic of ...*

To say that something has a logic, then, is to say that it can be understood by use of our reason, that we can form concepts that accurately — though not necessarily thoroughly — characterize the nature of that thing. Only when we have conceptualized a thing in some way, and only then, can we reason through it. Since nature does not tell us how to conceptualize it, we must create that conceptualization, individually or socially. Once conceptualized, a thing is integrated by us into a network of ideas (since no concept ever stands alone) and, as such, becomes the subject of many possible inferences.

Furthermore, once we begin to make inferences about something, we can do so either well or poorly, justifiably or unjustifiably, in keeping with the meaning of the concept and the nature of what we know of the thing conceptualized, or not so in keeping. If we are not careful, for example, we may (and very often do) infer more than is implied. If I hear a sound at the door and conceptualize it as "scratching at the door", I may then infer that it is my dog wanting to come in. I have used my reason (my capacity to conceptualize and infer) to interpret the noise as a "scratch" and I have assumed, in the process, that the only creature in the vicinity who could be making that scratch at my door is my dog... my reasoning may be off. I may have mis-conceptualized the noise as a "scratch" (I may even have misheard where the noise is coming from) or I may have wrongly assumed that there are no other creatures around who might make it. Notice that in these acts, I create the conceptualizations that are at the root of my thinking.

We approach virtually everything in our experience as something that can be thus "decoded" by the power of our minds to create a conceptualization and to make inferences on the basis of it (hence to create further conceptualizations). We do this so routinely and automatically that we don't typically recognize ourselves as engaged in processes of reasoned creation. In our everyday life we don't first experience the world in "conceptless" form and then deliberately place what we experience into categories in order to make sense of things.

Rather, it is as if things are given to us with their "names" inherent in them. So we see "trees", "clouds", "grass", "roads", "people", "men", "women", and so on. We apply these concepts intuitively, as if no rational, creative act were involved. Yet, if we think about it, we will realize that there was a time when we had to learn names for things and hence, before we knew those names, we couldn't possibly have seen these phenomena through the mediation of these concepts. In learning these concepts we had to create them in our own minds out of the concepts we already had learned.

I want to highlight the importance of this power of creative conceptualization and inference in human life, for it is precisely this power of mind that we must take charge of in forming disciplined habits of thought, thought which we summarize with the expression 'thinking critically'. In thinking critically we take command of our conceptual creations, assessing them more explicitly than is normally done. Concepts, like all human creations, can be well or poorly designed. Critical judgment is always relevant to the process of design and construction, whether that construction be conceptual or material.

For example, we study living organisms to construct "bio-logic", that is, to establish ways to conceptualize and make valid inferences about life forms. We study social arrangements to construct "socio-logic", that is, to establish ways to conceptualize and make valid inferences about life in society. We study the historical past to construct "the logic of history", ways to conceptualize and make valid inferences about the past. Since no one is born with these logical structures at his or her command, everyone must "create" them.

The Logic of Concepts

In this paper, we are using the word 'concept' to mean simply "a generalized idea of a class of things". We understand "conceptualization" to be a process by which the mind infers a thing to be of a certain kind, to belong properly to some given class of things. Hence, if I call something, or interpret something to be, an apple, I have placed it into a generalized class of things (the class of all apples). Our minds understand any particular aspect of things in relation to generalized ideas that highlight perceived similarities and differences in our experience. For example, the word 'dog' represents one concept, the word 'cat' another, the word 'cloud' a third, the word 'laughter' a fourth. We reason about, and so interpret the world, by putting the objects of our experience into "categories" or "concepts" each one of which highlights some set of similarities or differences for us, links the thing up with other concepts, and validates a certain set of inferences. For example, if I see a creature before me and take it to be a dog — that is, if I place it mentally into the category of 'dog' — I can reasonably infer that it will bark rather than meow or purr. Of course, I cannot reasonably infer that it will not bite me if I attempt to chase it away. Furthermore, by placing something into the concept of 'dog' I locate the thing in relation to other concepts, such as 'animal', 'furry', 'muzzle', 'paw', 'tail', and so forth.

In learning to speak our native language, we learn thousands of concepts which, when properly used, enable us to make countless legitimate inferences about the objects of our experience. Unfortunately, there is nothing in the way we ordinarily learn to speak a language that forces us to use concepts carefully or that prevents us from making unjustifiable inferences while engaged in their use. Indeed, a fundamental need for critical thinking is given by the fact that as long as the mind remains undisciplined in its use of concepts, it is susceptible to any number of illegitimate inferences.

The process of learning the concepts implicit in a natural language like English, is a process of creating facsimiles of the concepts implicit in the language usage, to which we are exposed. However, we cannot give anyone the meaning of a word or phrase; that meaning must be individually created by every person who learns it. When we mis-learn the meaning of a word, we create in our own minds a meaning that it doesn't have.

The Logic of Academic Disciplines

We can now understand each academic discipline to represent a domain in which humans are creating specialized concepts (and inferences that follow from those concepts) that enable them to approach that domain through an ordered set of logical relationships structured by human reason. Critical judgment is essential to all of the acts of construction; all acts of construction are open to critical assessment. We not only assess *what* we create; we assess as we create.

Each student who would learn the logic of a discipline has to create that logic in his or her own mind. Each moment of that creation requires the presence of critical thought and judgment. There is no way to create the logic for the student or simply to "give", transfer, or inject the logic in pre-fabricated form. By the same token, the logic of a text within a discipline enters the student's thinking only through the mediation of the logic of the student's thinking. But the logic of the student's thinking must be continually re-shaped and modified. The logic the student fashions in learning represents, if done well, an analytically modified logic, the result of a process of measured accommodation, not simply one of uncritical assimilation.

Hence, if a student reads a text within a discipline well, that is, critically, the logic he or she creates through reading matches the logic of the text well. Reading proficiently is both a creative task (a making, a creating) and a critical task (an assessing, a judging). The making and the assessing, the creating and the judging are integral to one seamless process of good reasoning. We create the logic of the text in our minds as we critically dialogue with it. We raise and answer probing questions as we read, generating and fashioning ideas and meanings in and through our responses.

This picture is complicated by those domains in which competing logics develop, each rationally defended by different, apparently equally expert, apparently equally rational, proponents. To some extent, of course, questions which call for the adjudication of competing logics emerge in all disciplines. On the other hand, some disciplines, namely those which attempt to conceptualize and make sense of human realities, seem to be inescapably "multi-logical": history, psychology, sociology, philosophy, anthropology, economics, literature, fine arts, and so forth. In these domains, seminal thinkers continue to emerge with alternative and conflicting ideas for reasoning about basic questions in the field. In this case, students have to create and reason within conflicting logics. Problems of confusion abound in this circumstance.

The creativity in reasoning one's way into disciplines which are multi-logical demands exacting and discriminating restraint and self-regulation. In reading, for example, the writings of Freud, Adler, and Jung, I must create in my mind three overlapping systems of thought, systems which complexely agree and disagree. If I come to understand what I have read, I have come to develop the ability to think within three different systems of thought. Only I, through a process of disciplined intellectual work, can generate, fabricate, engender in my mind Freudian, Adlerian, and Jungian thoughts. Only I can create the inner understandings which enable me to draw fine distinctions among their views, fine distinctions which honor the multiple logics they collectively developed. Instruction should provide incentives for students to actively create the logics of these conflicting perspectives and to critically assess that creation at one and the same time.

The Logic of Logic

Critical thinking can now be understood as a deep interest in *the logic of logic*, the art of taking charge of the large variety of ways in which we create concepts and make inferences by means of them, the various ways, in other words, in which we use human reason well or poorly in attempting to make sense of things and our created interpretations of them. Critical thinkers, on this view, attempt to heighten their awareness of the conditions under which their self-created conceptualizations — and inferences from them — are rationally justified. They not only use their innate capacity to reason, they also study how to improve the use of their reason, to discipline and "perfect" it (to make it more clear, precise, accurate, relevant, logical, consistent, respectful of evidence, responsive to good reasons, open to new ideas, and so forth). They habitually, therefore, reason about their reasoning. They routinely scrutinize their thinking as an act of on-going creation which must be continually monitored and checked for its "match".

In this way, critical thinkers maintain an acute and abiding interest in their own intellectual self-improvement. They carefully attend to their personal concept-creating and concept-using practices. They exercise special discipline in taking charge of their thinking by taking charge of the ideas that direct that thinking, by close examination of the ideas which they are generating and using to create an ordered set of meanings.

The Logic of Language

Many of our ideas or concepts come from the languages we have learned to speak (and in which as a matter of course we do our thinking). Embedded in the educated use of words are criteria or standards that we must respect in order to think clearly and precisely by means of those words. We are free, of course, to use a particular word in a special way in special circumstances, but only if we have good reason for modifying its meaning. Such special stipulations should proceed from a clear understanding of established educated use. We are not free, for example, to use the word 'education' as if it were synonymous with the word 'indoctrination' or 'socialization'. We are not free to equate pride with cunning, truth with belief, knowledge with information, arrogance with self-confidence, desire with love, and so on. Each word has its own established logic, a logic that cannot, without confusion or error, be ignored.

Though each word has an established logic, we still have to recreate that logic in our thinking, and we must base that creation on meanings we have previously created. Learning the meaning of a word is therefore not a simple task because in each case we must create a new concept in our minds out of modified old understandings. This requires that our creation be ordered, restrained, regulated, and controlled. The undisciplined creation of meaning in the context of learning the logic of language is nothing more nor less than the mis-learning of that logic.

The Logic of Student Thinking

Unfortunately many students do not understand the significant relationship between care and precision in language usage and care and precision in thought. Students often say, when talking about the nature of language, that people have their own meanings for all the words they use, not noticing that, were this true, we would not be able to understand each other. Students often speak and write in vague sentences because they have no criteria for choosing words other than that one word rather than another occurred to them. They do not seek to put their sentences into clear logical relationships to one another because they do not recognize any responsibility to do so nor any clear idea of what that would entail. They do not read, write, speak, or listen well because they have never had to think clearly about the logic of reading, writing, speaking, or listening.

All of the rational processes of mind are assumed by them to take care of themselves, automatically and effortlessly. Or better, they are unaware that there are any rational processes of mind to be tended to, in the first place. It goes without saying that students do not generally have any grasp of the creative dimension of all learning. They do not see themselves designing, fashioning, or shaping meanings. They think of themselves as simply absorbing meanings, as simply receiving what is being given to them by the teacher, the textbook, or experience itself.

The result of this common mind-set is that students find it very difficult, if not impossible, to master any well-developed or refined set of conceptual relationships. The logic of their own thinking is vague, fragmented, often contradictory, highly egocentric, typically sociocentric, pervasively undisciplined, and lacking in foundational insights. Since one begins to develop critical thinking significantly only insofar as one begins to discipline one's own thinking with respect to at least one framework of concepts, and since one learns a new set of concepts only by means of a set of previously learned concepts, the development of student thinking must take place over an extended period of time and must be heavily dialogical. Only by moving back and forth between their own undisciplined thought and some set of disciplined concepts, can they work their minds into disciplined thought.

Furthermore, there is the very real danger that, once developed, their emerging discipline in one domain will remain isolated and segregated from the rest of their thinking. Even expert thinkers in one domain are often atrocious in another. The human mind does not necessarily develop as an integrated whole. This is one of the reasons why it is important to emphasize critical thinking as critical thinking, in its most generalizable form. Hence, when learning to think with discipline in one domain of concepts, it is highly useful to be exposed to logically illuminating parallel examples from other domains.

Finally, lacking the discipline of critical thinking and judgment, the creative dimension of student thinking is commonly quite undistinguished. What they "create" is typically poorly designed and constructed. For example, since their own thinking is vague and fragmented, they routinely generate vague and fragmented meanings in the process of learning; their minds bring into being disjointed meanings which often have no single, definite logic whatsoever. It is important to recognize that in a literal sense there is no necessary virtue in "creating" meaning. Prejudices, self-delusions, distortions, misconceptions, and caricatures are all products of the mind as maker and creator.

The Logic of Questions

Every question, when well put, imposes specific demands upon us, demands implicit in the logic of the words of the question and in the contexts in which those words are intelligibly used by educated speakers of the language. If I ask, "What is the sum of 434 and 987?", the question requires an answer consonant with the established logic of the word 'addition'. If I ask, "Is Jack your friend or merely an acquaintance?", the question requires an answer in keeping with the logic of the established distinction between the words 'friend' and 'acquaintance'. If I ask you "To what extent are your students learning to think critically?", the question requires that you *1)* understand precisely what is implied by the expression 'thinks critically' and *2)* assess your students' thinking by some means appropriate to determining the relative standing of your students either with respect to a fixed ideal of critical thinking or some standardized norm to which your students' performances (of thinking) can appropriately be compared. An appropriate answer is one that is constructed in accordance with the logical demands of the question.

Very often, people are cavalier in their putting and answering of questions. They rarely put their own questions precisely, and, when answering the questions of others, they often respond impressionistically or otherwise inappropriately, without care, discipline, or sen-

sitivity to what is implied by the established logic of the question (or by the context in which the question is asked). When called upon to sharpen their questions or to respond more carefully and precisely, many respond with irritation or annoyance, exasperated that they are expected to be clear or precise or accurate or relevant or consistent in their question-asking or -answering behaviors.

This general insensitivity to the logic of questions is part of the broader phenomenon of insensitivity to the logic of language, which is itself part of the even broader phenomenon of insensitivity to the need for care and discipline in our use of reason — our use of concept and inference — in figuring out the logic of the world within and around us. All of these, in turn, are part of the general insensitivity to the need to discipline our mind's creative productions, to shape them in accord with restraining conditions. Sometimes these restraining conditions are given by the logic of language, sometimes by the logic of the material world.

✦ *The Elements of Thought*

As soon as we move from thought which is purely associational and undisciplined, to thought which is conceptual and inferential, which attempts in some intelligible way to figure something out, to use the power of creative reason, then it is possible, and helpful, to think about what might be called "the elements of thought", the basic building-blocks of thinking, the essential dimensions of all reasoning whenever and wherever it creates meaning. There is, in other words, a general logic to the use of reason. We can deduce these elements, these essential dimensions of reasoning, by paying close attention to what is implicit in the attempt on the part of the mind to figure anything out whatsoever. Once we make these elements of thought clear, it will be obvious that each of them can serve as an important touchstone or point of assessment in our critical analysis and assessment of the constructed process and products of our thinking. As meaning makers we must be exacting, discriminating, and fastidious. Without a guiding logic, thinking is aimless and random. Productive thinking needs some structure, some basic logic to follow.

We have already noticed that the attempt to render something intelligible requires the construction of concepts, the creation of interpretations and understandings based on them, and inferences drawn from them. We can now set out the basic set of conditions implicit in these creative, critical acts of the mind, whenever they occur. They are as follows:

1) *Purpose, Goal, or End in View:* Whenever we reason, we reason to some end, to achieve some purpose, to satisfy some desire or fulfill some need. One source of problems in reasoning is traceable to "defects" at the level of goal, purpose, or end. If our goal itself is unrealistic, contradictory to other goals we have, confused or muddled in some way, then the reasoning we use to achieve it is problematic. The goal, purpose, or end of our thinking is something our mind must actively create.
2) *Question at Issue (or Problem to Be Solved):* Whenever we attempt to reason something out, there is at least one question at issue, at least one problem to be solved. One area of concern for the reasoner should therefore be the very formulation of the question to be answered or problem to be solved. If we are not clear about the question we are asking, or how the question relates to our basic purpose or goal, then it is unlikely that we will be able to find a reasonable answer to it, or one that will serve our purpose. The question at issue in our thinking is something our mind must actively create.
3) *Point of View or Frame of Reference:* Whenever we reason, we must reason within some point of view or frame of reference. Any defect in our point of view or frame of reference is a possible source of problems in our reasoning. Our point of view may be too narrow or too parochial, may be based on false or misleading analogies or metaphors, may not be precise enough, may contain contradictions, and so forth. The point of view which shapes and organizes our thinking is something our mind must actively create.
4) *The Empirical Dimension of Our Reasoning:* Whenever we reason, there is some "stuff", some phenomena about which we are reasoning. Any defect, then, in the experiences, data, evidence, or raw material upon which our reasoning is based is a possible source of problems. We must actively decide which of a myriad of possible experiences, data, evidence, etc. we will use.
5) *The Conceptual Dimension of Our Reasoning:* All reasoning uses some ideas or concepts and not others. Any defect in the concepts or ideas (including the theories, principles, axioms, or rules) with which we reason, is a possible source of problems. The concepts and ideas which shape and organize our thinking must be actively created by us.
6) *Assumptions* — The Starting Points of Reasoning: All reasoning must begin somewhere, must take some things for granted. Any defect in the starting points of our reasoning, any problem in what we are taking for granted, is a possible source of problems. Only we can create the assumptions on the basis of which we will reason.
7) *Inferences:* Reasoning proceeds by steps called inferences. To make an inference is to think as follows: "Because this is so, that also is so (or probably so)". Any defect in the inferences we make while we reason is a possible problem in our reasoning. Information, data, and situations do not determine what we shall deduce from them; we create inferences through the concepts and assumptions which we bring to situations.
8) *Implications and Consequences* — Where Our Reasoning Takes Us: All reasoning begins somewhere and proceeds somewhere else. No reasoning is static. Reasoning is a sequence of inferences that begin somewhere and take us somewhere else. Thus all reasoning comes to an end, yet could have been taken further. All reasoning has implications or consequences beyond those the reasoner has considered. Any problem with these (implications that are false, undesirable consequences), implies a problem in the reasoning. The implications of our reasoning are an implicit creation of our reasoning.

If we taught each school subject in such a way that students had to reason their way into the subject, and if we routinely questioned students so they came to habitually look into each basic dimension of their thinking — purpose, question at issue, point of view, data,

concepts, assumptions, inferences, implications and consequences — they would progressively become more disciplined in their reasoning, more self-critical and self-directed in the process and products of their thinking.

THE LOGIC OF READING, WRITING, SPEAKING, AND LISTENING

Reading, writing, speaking, and listening are all "dialogical" in nature. That is, in each case there are at least two logics involved, and there is an attempt being made by someone to translate one logic into the terms of another. Consider reading and listening. In both of these cases we are attempting to make sense of the logic or reasoning of another person. Whatever is written must, if it is reasoned, contain all of the elements of thought, and as a critical reader one can question the text as one goes seeking to determine: What is the central purpose of the writer of the text, what problems or issues does she raise? Within what point of view is she reasoning? What is she assuming or taking for granted? What evidence, information, or data is presented to us? How is that evidence interpreted or conceptualized? What are the key concepts or ideas in the text? What lines of reasoning are formulated? What key inferences are made? Where is the reasoning taking us? What is implied by it? If this reasoning were taken seriously and made the basis for action or policy, what consequences would follow? Furthermore, each of these dimensions of reasoning could be looked at from the point of view of the "perfections" of thought, those intellectual standards which individually or collectively apply to all reasoning. (Is it clear, precise, accurate, relevant, consistent, logical, broad enough, based on sound evidence, utilizing appropriate reasons, adequate to our purposes, and fair, given other possible ways of conceiving things?)

It is this disciplined process of critical analysis that enables one to create in one's mind the logic of the text, to construct a system of meanings that mirror, to the best of one's ability, the system of meanings inherent in the text.

✦ *Intellectual Standards*

All intellectual standards are derived from some humanly created logic or are implied in the very nature of things themselves, including *universal criteria* implicit in intellectual history and educated discourse within that history, *the logic of concepts and words* implicit in educated usage, *the logic of questions* implicit in academic practice and educated usage, and *the logic of subject matter* implicit in the nature of things themselves. For example, it would be unintelligible to say, "I want to reason well but I am indifferent as to whether or not my reasoning is clear, precise, accurate, relevant, logical, consistent, based on appropriate evidence and reasons, ..." By the same token, it would be unintelligible — unless very special circumstances prevailed — to say "I am trying to determine whether or not I am a 'selfish' person, but I am not concerned with what the word 'selfish' implies." The logic of the question, "Is Jack a selfish person?" is basically revealed by understanding the established uses of the word 'selfish' in educated discourse.

✦ *The Logic of Teaching*

(Assuming that the most basic goal of education is to foster the general, reasoned, intellectual development of students.) To teach a student critically is to devise activities and an environment conducive to the general, reasoned, intellectual development of students. By the model we present, the goal will be seen to entail cultivating students' ability to reason "creatively and critically" (viewed as inseparable dimensions of good thinking) with respect to the logic of any subject matter they study, in such a way as to maximize the development, over an extended period of time, of general intellectual standards and disciplined minds, minds strongly motivated to reason rigorously and analytically with respect to any problem, issue, or intellectual task to which they afterward set themselves. The ability to read, write, speak, and listen as forms of disciplined reasoning, as forms of disciplined questioning, become central goals on the model because each is a basic modality of reason through which we learn much of what we learn. As teachers committed to the intellectual development of our students, we introduce our students not only to the logic of what they are studying but also to the very logic of logic, i.e., critical thinking, so that they begin as soon as possible to discipline their minds in a general and not simply in a subject-specific way. Through that discipline, the created products of their thinking become useful products, products fashioned, to the degree that they develop critical judgment, with acute discrimination and fastidious discernment. That minds will create meanings is not in doubt; that they will create meanings that are sound, insightful, or profound is.

✦ *Conclusion*

Creativity, as a term of praise, involves more than a mere haphazard or uncritical making, more than the raw process of bringing something into being. It requires that what is brought into being meet criteria intrinsic to what it is we are trying to make. Novelty alone will not do, for it is easy to produce worthless novelty. Intellectual standards and discipline do not stand in the way of creativity. Rather, they provide a way to begin to generate it, as it must be generated: slowly and painfully, one student at a time, one problem at a time, one insight at a time. If we can engage each of our students passionately in genuine intellectual work on genuine intellectual problems worthy of reasoned thought and analysis, and continually help each student to become a more judicious critic of the nature and quality of his or her thought, we have done all we can do to make likely both the critical and the creative development of each student. It is stimulating intellectual work that develops the intellect simultaneously as both a creator and evaluator: as a creator that evaluates and as an evaluator that creates. Fitness of mind, intellectual excellence, is the result.